Structure and Function of Marine Ecosystems

- Challenges of Integrating Ecosystem Knowledge
- Definitions
- Key Processes in Marine Ecosystems
- Status of Ecosystem Science

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LOUISIANA
25 square miles of coastal wetlands lost per year
Lower Mississippi River Basin
Heavy Industry
Nursery Habitat
Coastal Communities
Gulf Estuaries
Harmful Algal Blooms
Hypoxia Zone
Loop Current Eddy
Sustainable Fisheries
Coral Reefs
Oil & Gas Platforms
Oil & LNG Tankers
LOOP CURRENT
Ocean Observations
HURRICANES
GULF OF MEXICO
Sea Turtles
N
W
E
S

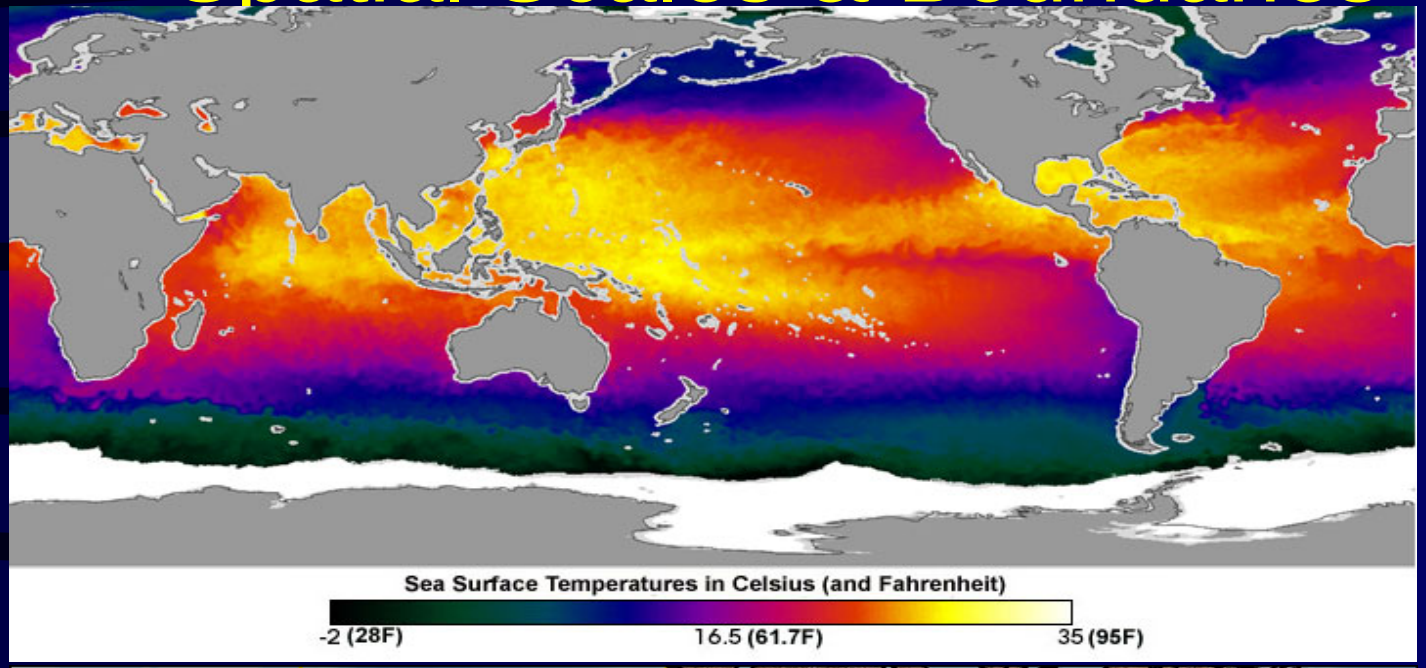
Definitions

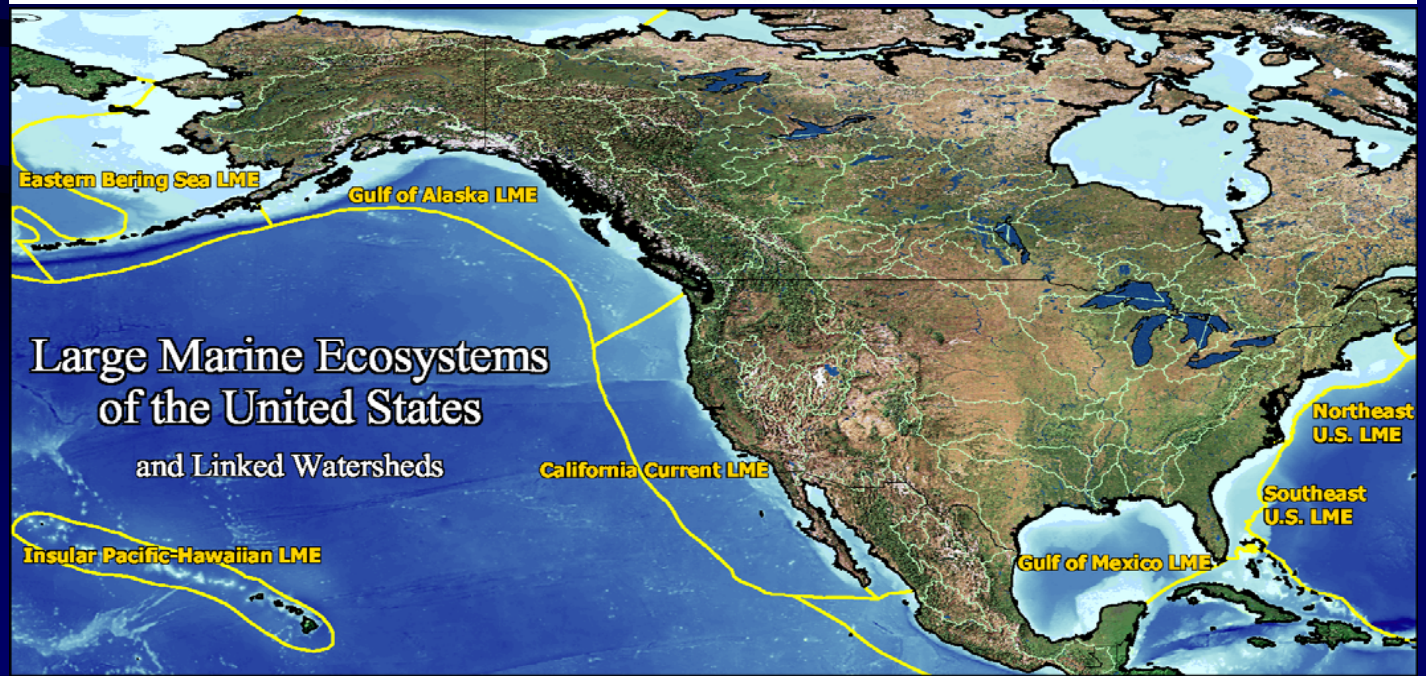
An *ecosystem* is a geographically specified system of organisms (including humans), the environment, and the processes that control its dynamics.

The *environment* is the biological, chemical, physical, and social conditions that surround organisms.

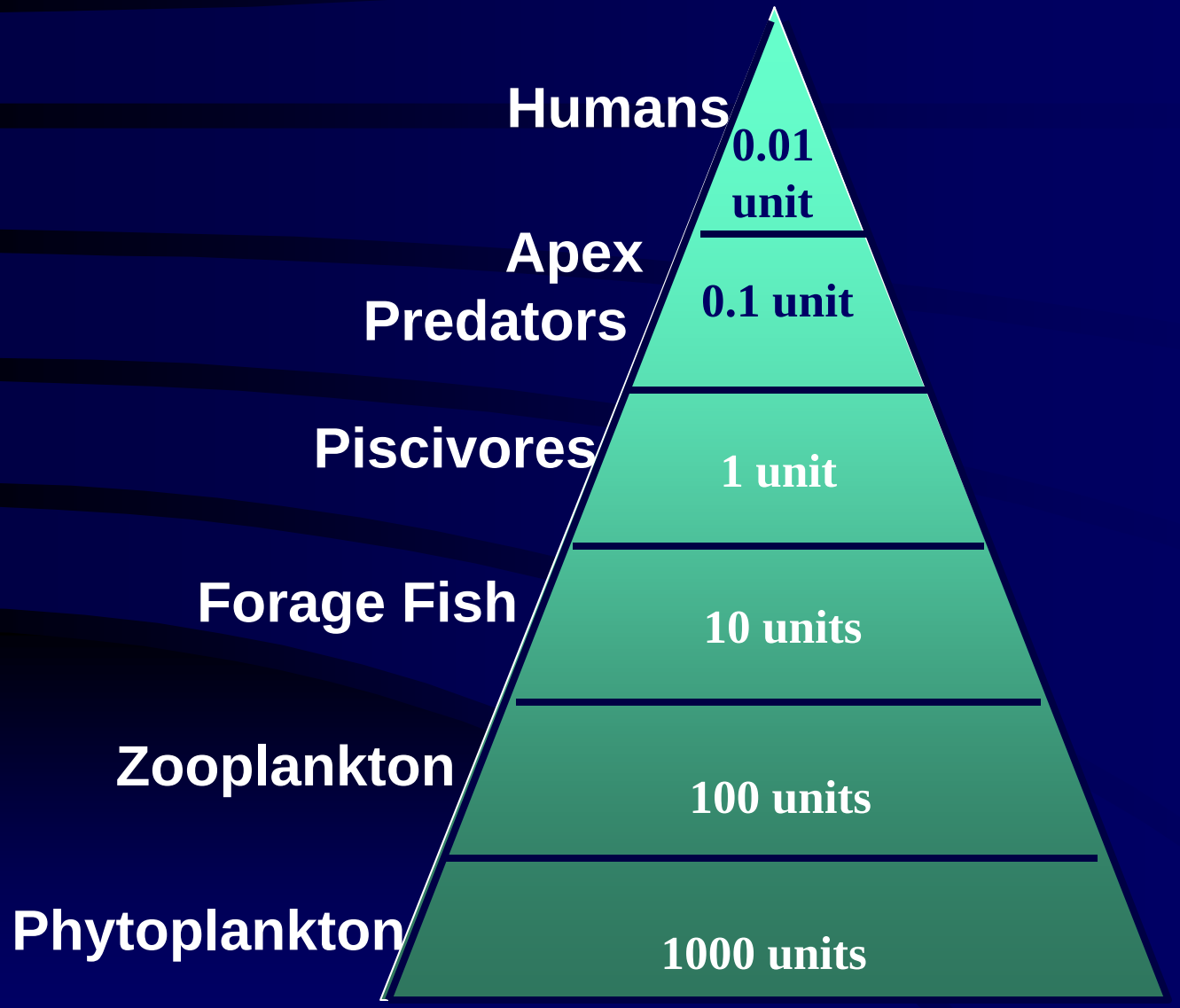
When appropriate, the term environment should be qualified as biological, chemical, physical, and/or social.

Spatial Scales & Boundaries



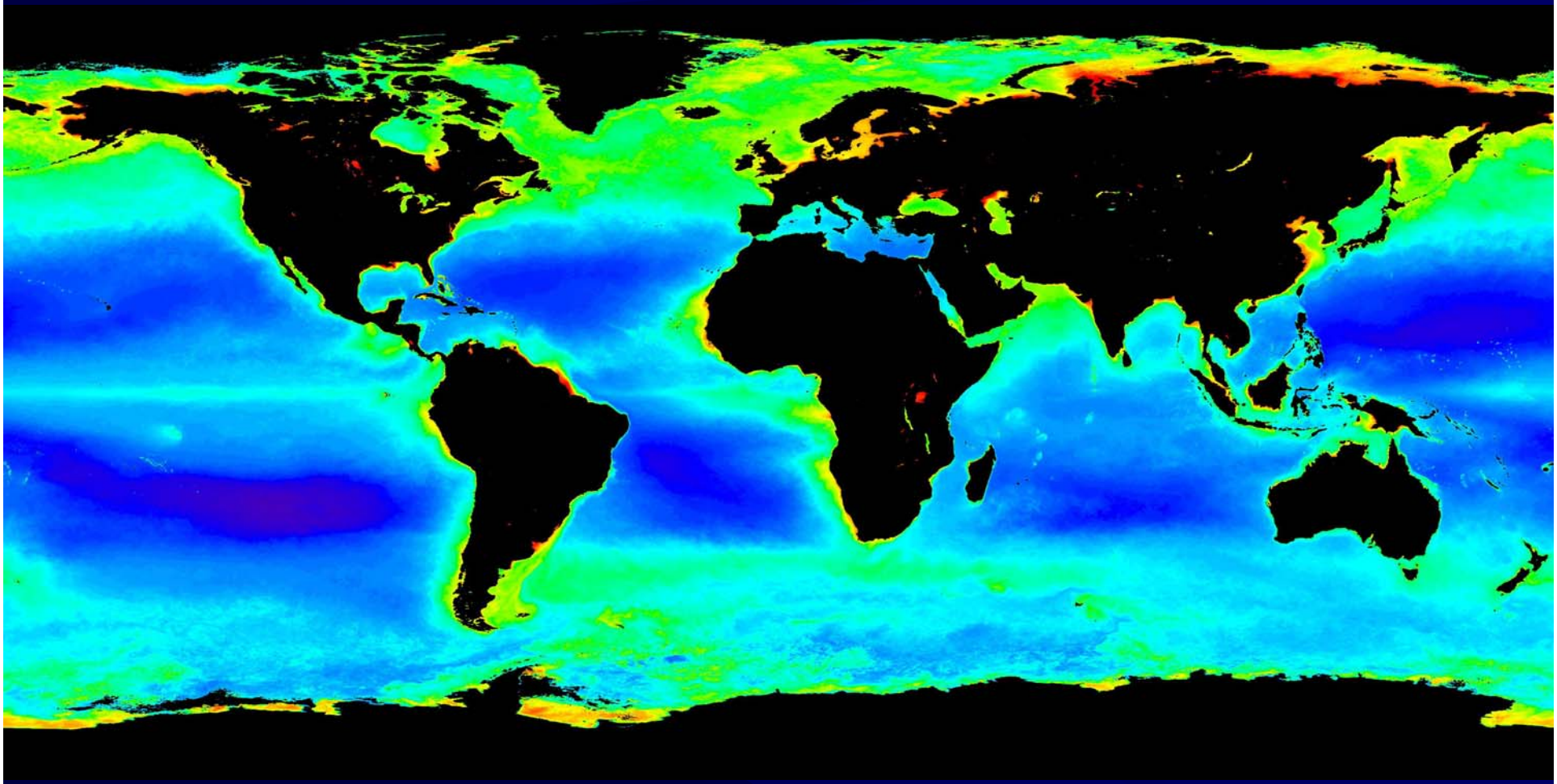


The Trophic Pyramid and Energy Flow



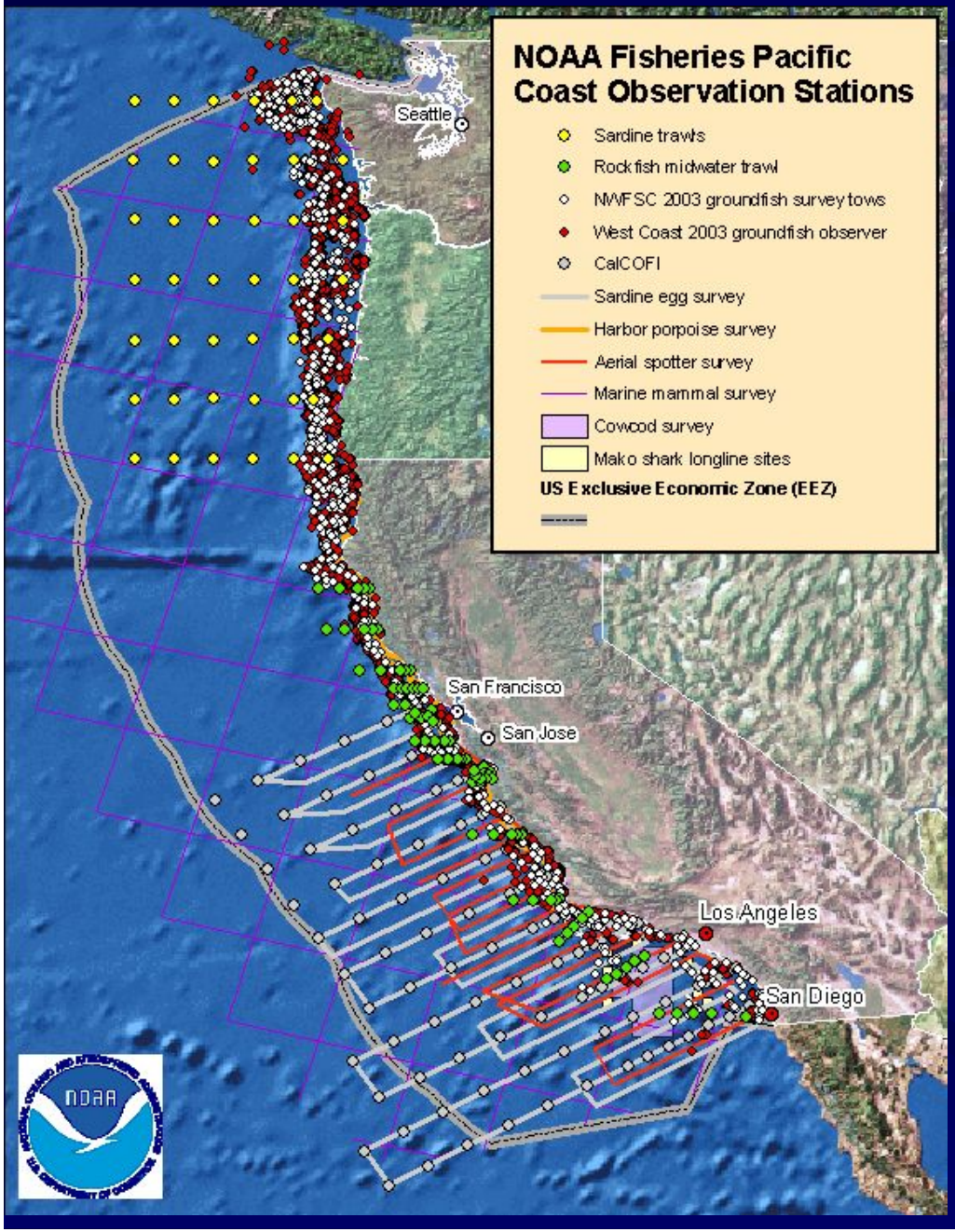
If transfer efficiency is 10%

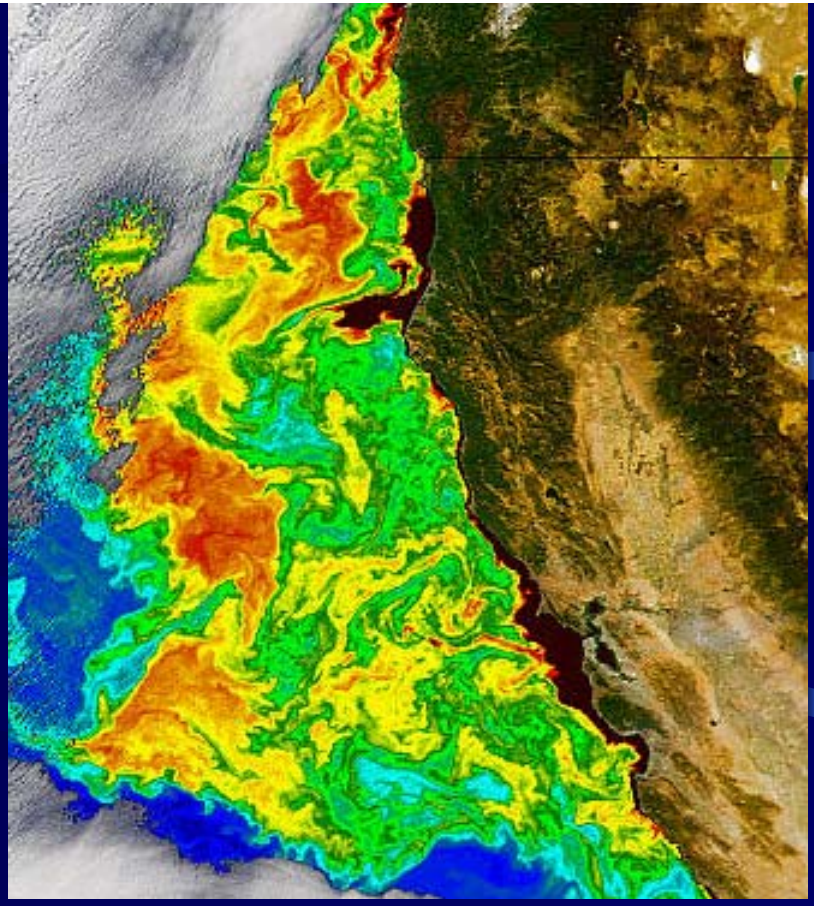
Photosynthesis occurs primarily in waters less than 200 meters deep, which make up about 7% of the World's Oceans

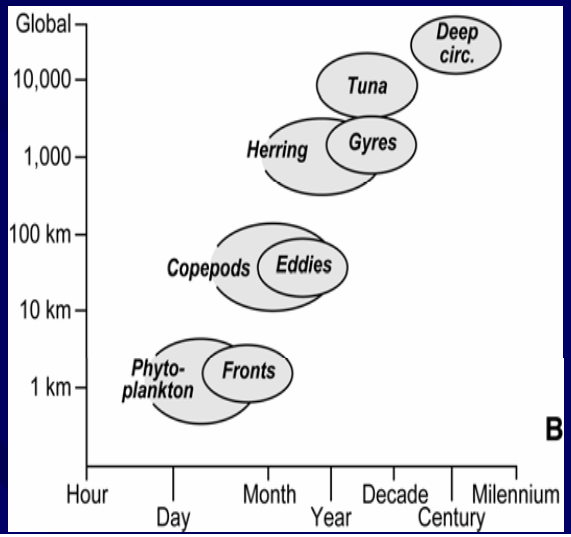


below 200 m, nutrients accumulate and must be brought to the surface in order to support production - by upwelling & currents

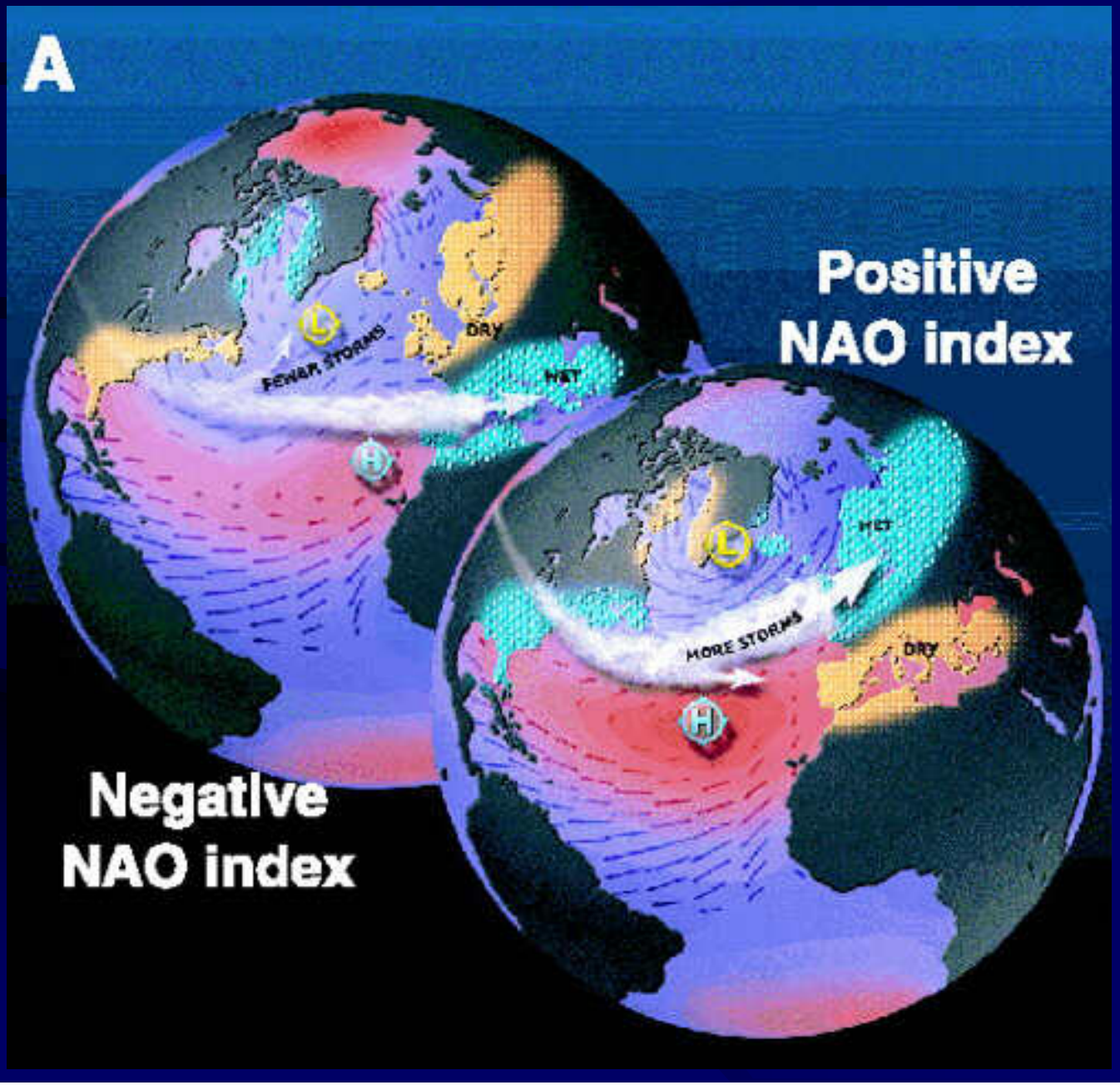
Scales and Observations



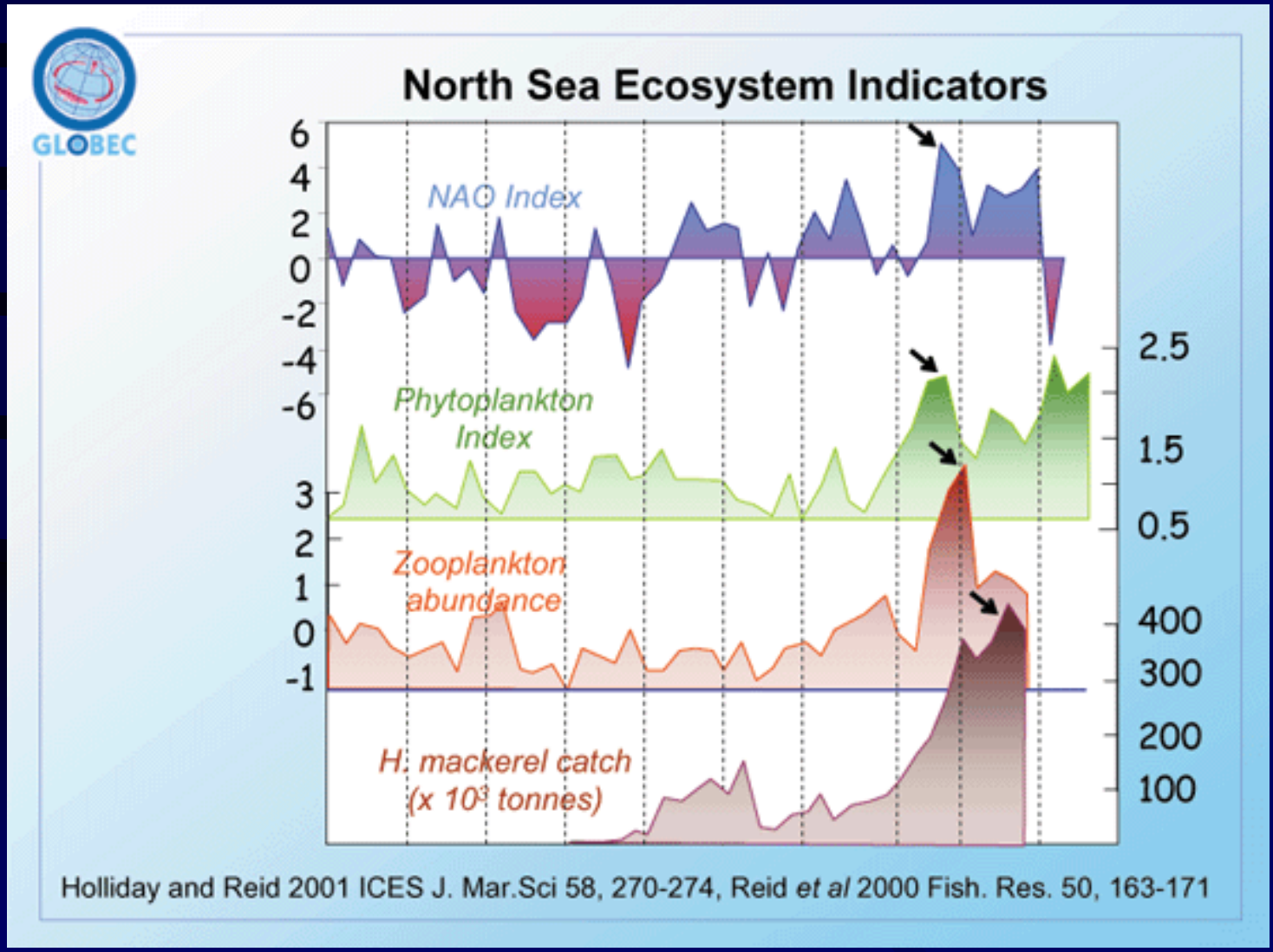




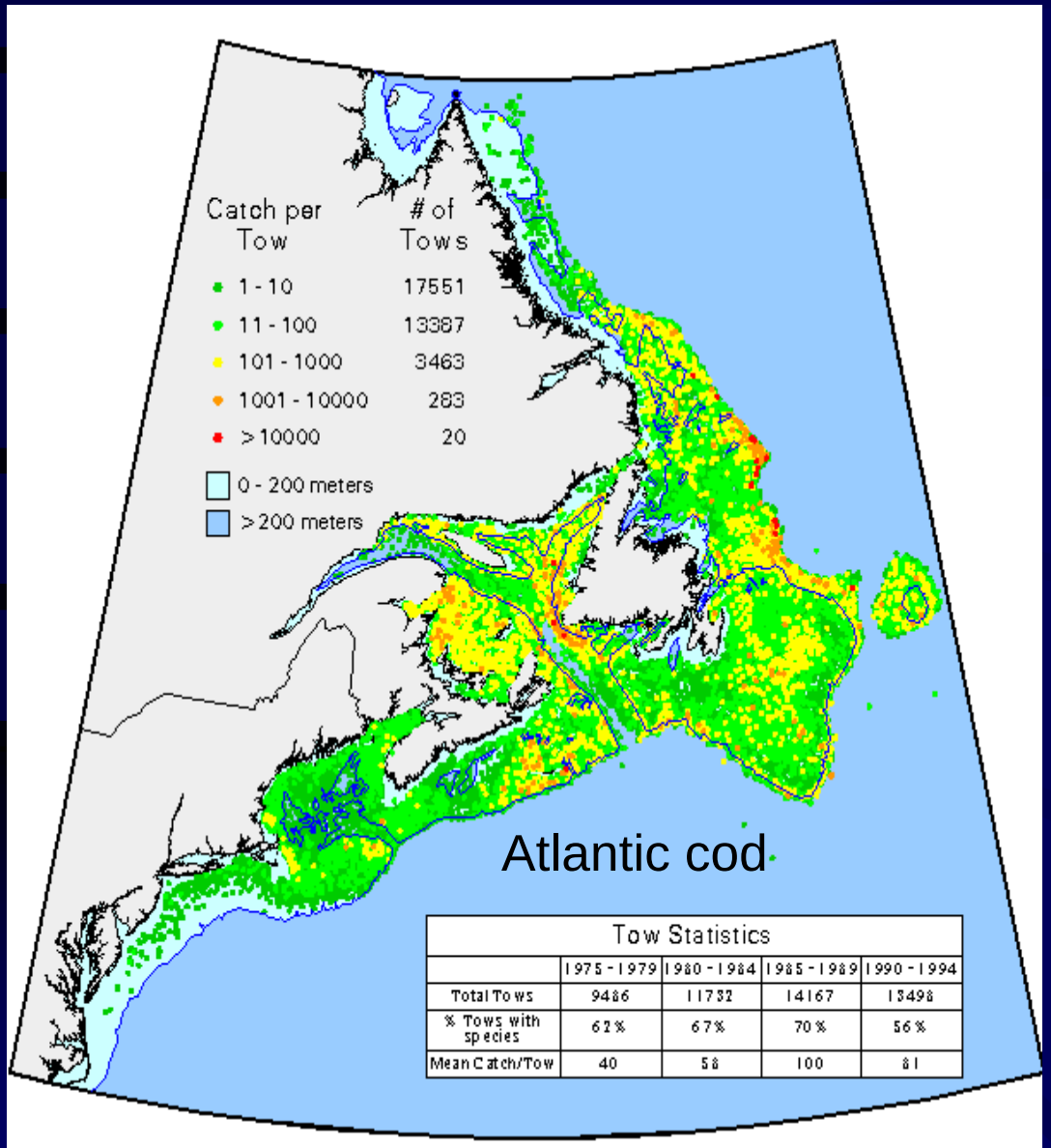
Regional Climatology Affects Ecosystems



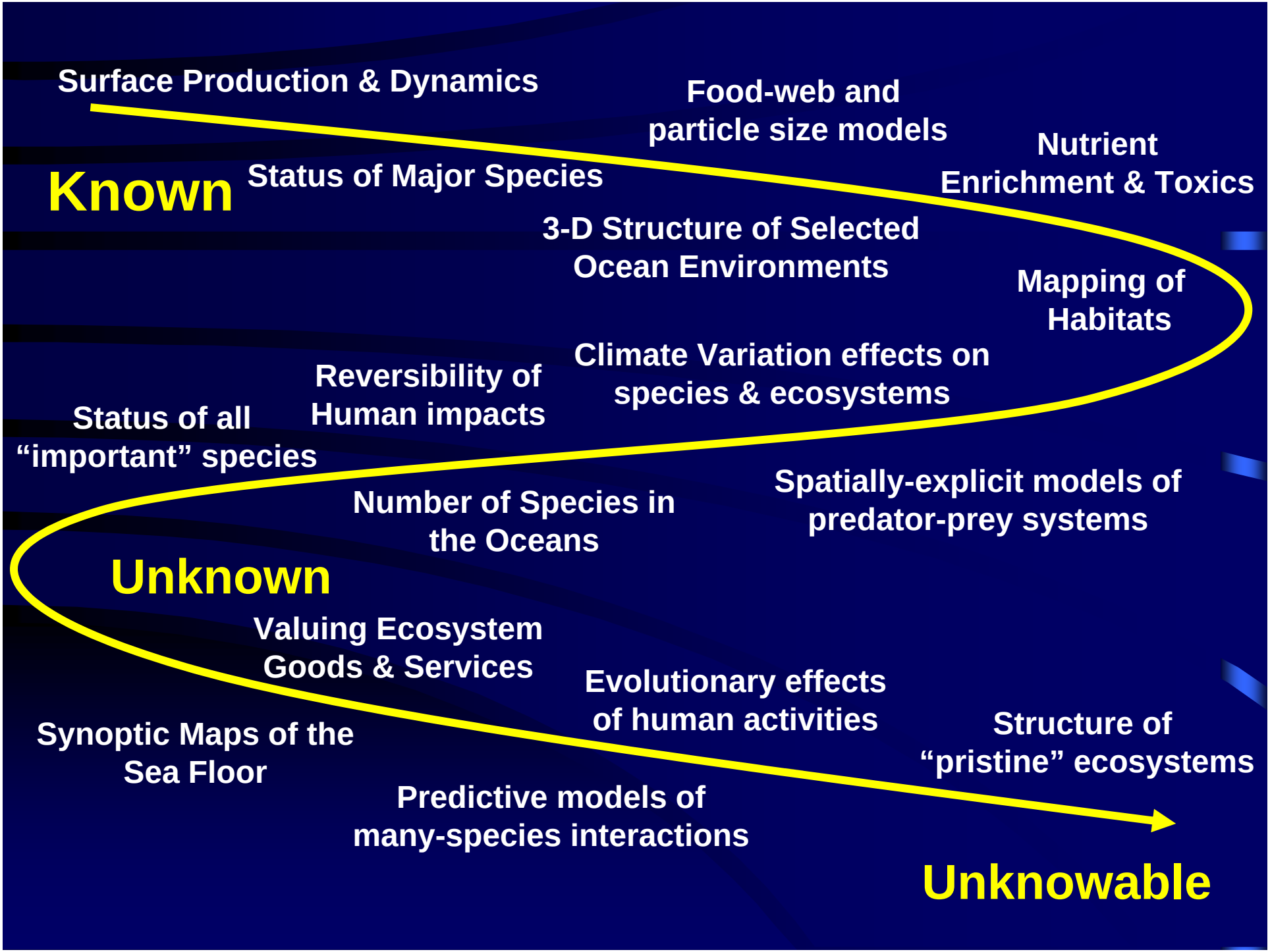
Interactions Between Physical & Biological Components of Ecosystems



Harvesting Affects Distributions & Abundances of Species



Tow Statistics				
	1975 - 1979	1980 - 1984	1985 - 1989	1990 - 1994
Total Tows	9486	11732	14167	13498
% Tows with species	62%	67%	70%	56%
Mean Catch/Tow	40	58	100	81


Surface Production & Dynamics
Food-web and particle size models
Nutrient Enrichment & Toxics
Known
Status of Major Species
3-D Structure of Selected Ocean Environments
Mapping of Habitats
Climate Variation effects on species & ecosystems
Reversibility of Human impacts
Status of all "important" species
Spatially-explicit models of predator-prey systems
Number of Species in the Oceans
Unknown
Valuing Ecosystem Goods & Services
Evolutionary effects of human activities
Synoptic Maps of the Sea Floor
Structure of "pristine" ecosystems
Predictive models of many-species interactions
Unknowable